As is clear from Tables 2 and 3, monomer b) has to be a monofunctional low-molecular weight compound having a glass transition temperature, Tg, of at least 90 °C after polymerization. If monofunctional monomers having Tg of lower than 90 °C are used, the resulting cured films have low Young's moduli and cannot be deformed permanently. If polyfunctional monomers are used, the Young's modulus increases and the cured films become brittle. The tensile strength of cured films is also related closely to Tg after polymerization and it was apparent that satisfactory tensile strength could not be attained when monofunctional monomers of low Tg were used.

Example 3

Samples of the resin composition (2) were prepared as in Example 2 using urethane acrylate UX 4101 or UV 7700B as compound a), IA, IMA or TA as compound b), and CHA, tBA, IBA or DPA as compound c). The results of various tests and measurements conducted on the samples are shown in Table 4.

Table 4 - Resin Formulations and the Mechanical Properties of Films Cured with Electron Beams

b)	c)	a)/b)/c)	Tensile strength (kg/cm^2)	Elongation (%)	Young's modulus	180° Bend test	Permanent deformation	Shape recovery temperature (°C)
a) = UV 7700B								
IA	-	95/ 5/0	180	60	760	o	×	-
IA	-	90/10/0	240	60	1700	o	×	-
IA	-	75/25/0	360	50	5100	o	Δ	45
IA	-	50/50/0	490	5	12000	×	×	-
a) = UX 4101								
IA	CHA	40/20/40	310	40	15000	o	o	55
IA	tBA	50/10/40	380	110	9900	o	o	45
IA	IBA	50/10/40	380	60	10000	o	o	65
IA	DPA	50/10/40	380	70	9500	o	o	60
IMA	CHA	40/20/40	360	80	6400	o	o	70
TA	CHA	40/20/40	280	50	6900	o	o	55

As Table 4 shows, the addition of compound b) to urethane acrylate UV 7700B contributed higher Young's modulus and tensile strength but the decrease in elongation was not substantial and the resulting cured films had the desired shape-memorizing effect. The unique effect of compound b) will become apparent by comparison with the UV 7700B/HDDA system shown in Table 3. The addition of HDDA to UV 7700B caused considerable drop in elongation and the cured films became brittle. Many varieties of shape-memorizing films can be produced by adding compound b) and monofunctional monomers to UX 4101.